

Diabetes Management

Management Approaches For the School Nurse

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Objectives for today

1. Briefly describe current prevalence and medical management of diabetes in US pediatric populations.
2. Describe current nursing management principles for the child with type 1 and type 2 diabetes.
3. Describe what non-nursing school personnel need to know about the child with diabetes at school.

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Difference between Type 1 and Type 2 Diabetes

- | | |
|--|--|
| <ul style="list-style-type: none">○ Type 1○ Insulin Dependent○ Must take Insulin daily to live.○ Generally thin, active, Caucasian○ Thought to as young○ Develop ketoacidosis○ 10% of the diabetes population | <ul style="list-style-type: none">○ Type 2○ Not Insulin dependent○ May alter diet, take a pill or need insulin to live.○ Often overweight, sedentary○ Often African American, Native America○ This is a disease of aging○ Hereditary disease○ 90% of the diabetes population |
|--|--|

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Causes of Type 1 and Type 2 Diabetes

- | | |
|--|--|
| <ul style="list-style-type: none">○ Genetic Pre-disposition○ Stressor<ul style="list-style-type: none">● Illness – virus● Puberty○ Autoimmune disease | <ul style="list-style-type: none">○ Family history○ Age○ Gender○ Overweight○ Lack of Activity○ Stress<ul style="list-style-type: none">● Emotional● Physical |
|--|--|

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Differentiate Type 1 from Type 2

- | Type 1 | Type 2 |
|--|--|
| <ul style="list-style-type: none">○ Onset<ul style="list-style-type: none">● Acute-symptomatic○ Clinical picture<ul style="list-style-type: none">● Weight loss● Frequent urination● Thirst● Fatigue | <ul style="list-style-type: none">○ Onset<ul style="list-style-type: none">● Slow-often no symptoms.○ Clinical picture<ul style="list-style-type: none">● Thirst, fatigue● Obese● Strong family history of type 2● Ethnicity-high prevalence populations● Acanthosis nigricans● PCOS |

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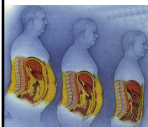
Differentiate Type 1 from Type 2 in Youth

- | Type 1 | Type 2 |
|---|---|
| <ul style="list-style-type: none">○ Ketoacidosis<ul style="list-style-type: none">● Present at diagnosis○ Labs<ul style="list-style-type: none">● Blood sugars● Alc● C-peptide negative● Insulin antibodies positive● Anti-GAD positive○ Therapy<ul style="list-style-type: none">● Always Insulin | <ul style="list-style-type: none">○ Ketoacidosis<ul style="list-style-type: none">● Usually Absent○ Labs<ul style="list-style-type: none">● Blood sugars● Alc● C-peptide positive● Insulin antibodies negative● Anti-GAD negative○ Therapy<ul style="list-style-type: none">● May need insulin to start and then pills and lifestyle change. |

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Metabolic Syndrome or Pre-Diabetes

- A cluster of symptoms that describe a syndrome.
- This is a **predictable pattern**.
 1. Genetic pre-disposition for diabetes.
 1. Generally Type 2
 2. Weight gain
 1. As much as 5 to 10 pounds starts this process
 2. People who carry their weight around their waist are at higher risk for pre-diabetes.
 3. 9 out of 10 newly diagnosed with type 2 diabetes are overweight.



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Metabolic Syndrome or Pre-Diabetes

3. High Insulin Levels develop
 1. Insulin resistance developing
 2. Fasting blood sugar between 100 and 125 mg
4. Lipids are changing
 1. Elevated triglycerides
 2. Low HDL
 3. Change in particle LDL particle size

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Metabolic Syndrome or Pre-Diabetes

5. Blood Pressure is elevating
 - Goal is <130/80 (<125/75)
6. Blood sugars are elevated just enough to be diagnosed with diabetes
 1. To diagnose Diabetes -- A Fasting blood sugar >125mg twice.
7. Then the person moves on to the late stages of diabetes where the complications can develop.

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Another sign to watch for...

- **Acanthosis Nigricans** - An eruption of velvety, hyperpigmented plaques and warty-papules in the axillae, groin, neck, and/or anogenital region.
- The adult form of acanthosis nigricans may be associated with diabetes mellitus or insulin resistance (normal glucose, elevated insulin), obesity, medications, and internal malignancies.
- A benign hereditary type occurs in children.
- Plaques are most often noticed in the skin folds of the neck and axilla and are compared to dirt-stained skin folds.

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Acanthosis Nigricans



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Acanthosis

- This can be treated.



This picture shows the front neck of a 15 year-old girl before she began eating more fruits and vegetables and walking.



This is the same girl six weeks after making her changes and losing 12 pounds.

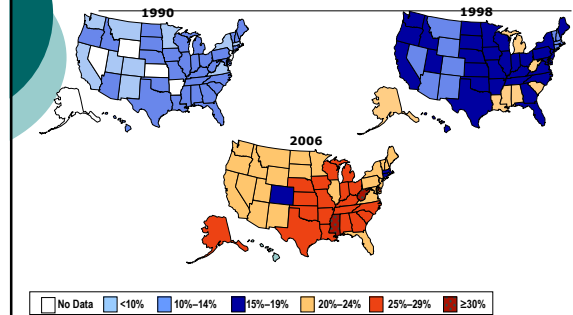
Diabetes complications

- Eyes
- Kidney disease
- Heart
- Circulation
- Feet – amputations
- Neuropathy
- Causes
 - Blood sugars > 150 mg over time.
 - Time is defined as > 5 years
- Most people have had type 2 diabetes for 5-10 years before they are diagnosed.

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Obesity Trends* Among U.S. Adults BRFSS, 1990, 1998, 2006

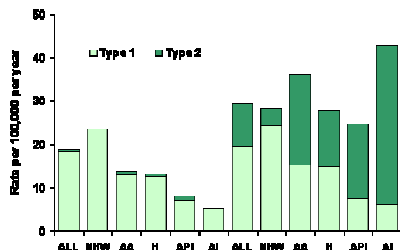
(*BMI ≥30, or about 30 lbs. overweight for 5'4" person)



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2002-2003 data
< 5 years

5 – 19 years



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What does this have to do
with Children and
Diabetes?



children with DIABETES
www.childrenwithdiabetes.com

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Thinking back.....

- Think about yourself and your class mates when you were in third grade.
 - How many overweight kids were there?
- Now, look at the third grade class of today
 - How many overweight kids are there?




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- Previously, Type 2 diabetes was a disease of middle-aged and older people.
- In recent decades, the age of onset has decreased and type 2 diabetes has been reported in adolescents and children worldwide.

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- The incidence of type 2 diabetes in the young is rising in parallel with the incidence of overweight and obesity.
 - There has been a 27% increase in child obesity rates.
 - Pediatric obesity is increasing at a faster rate than adult obesity.
 - Before puberty fat cells are not permanent ---- after puberty it is very hard to lose weight.

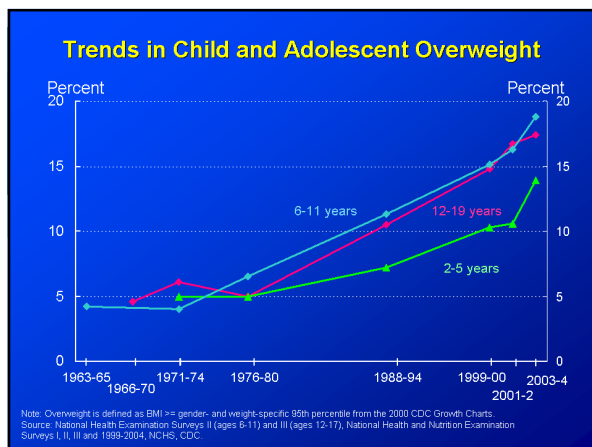


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- Especially when the obesity is central and in relation to decreased physical activity (metabolic syndrome).
- Other factors that increase risk include family history, gestational diabetes in the mother and low birth weight.
- The obesity rate started increasing 4-5 years before the diabetes rate started increasing.

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Obesity prevalence among low-income, preschool-aged children, 1998 to 2008

1. Reduction of obesity among children and adolescents is a national priority in the U.S.
2. Children obese in preschool are more likely to be obese as adults and more likely to have diabetes, hypertension, hyperlipidemia, asthma and sleep apnea.
3. These kids are a "predictor" of things to come.

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Obesity prevalence among low-income, preschool-aged children, 1998 to 2008

4. This was a study of low-income, pre-school age children (WIC data).
5. Obesity rates for the 2-5 year o
 1. in 1998 was 12.4%
 2. In 2003 was 14.5%
 3. In 2008 was 14.6%
6. Could the obesity rates be stabilizing?

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Obesity prevalence among low-income, preschool-aged children, 1998 to 2008

- Likely causes include promotion of breast feeding, WIC providing low fat milk, decreased TV viewing.
- National Health and Nutrition Examinations Survey found no significant increase in obesity prevalence during 1999-2006 in children aged 2-19 years.
- During 2003-2008, obesity stayed stable among all groups except American Indian / Alaska Native children.

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- Type 1 still remains the main form of diabetes in children worldwide,
 - It is expected that Type 2 diabetes will be the predominant form within the next 10 years in many ethnic groups.

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How is Diabetes Managed

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Meal Planning

- Eating "sugar" does not cause diabetes, but "sugar" becomes the problem.
- There must be **consistency in timing of meals**.
- There must be **consistency in the amount** of food the child eats.
- Meals should be every 4-5 hours with snacks in between.
- Carbohydrates affect the blood sugar.

Carbohydrate Counting

- Carbohydrate----- Energy
100% turns to sugar
 - Protein-----Muscle / tissue repair
Does not affect blood sugar
 - Fat----- Body function
Does not affect blood sugar
- All three are needed for normal growth and development. The focus is on the amount of carbohydrate per meal.

Proteins



- Meat – chicken, fish, beef, turkey, pork
- Cheese
- Eggs
- Peanut Butter
- Tofu
- Nuts



Fats

- Butter, margarine
- Mayonnaise
- Sour cream
- Bacon
- Cheese Sauce
- Salad Dressing
- Nuts



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Carbohydrate Counting

- Carbohydrates are found in
 - Breads, starches, cereals, grains
 - Fruit and Fruit juices
 - Milks
 - Some vegetables
 - Other carbohydrates (cakes, donuts, pop, cookies, ice cream, candy, etc.)



15 grams of carbohydrate

1 slice of bread	1/3 cup rice/pasta
1 small apple	3 cups popped popcorn
8 ounces milk	1/2 hamburger bun
1/2 cup oatmeal	3/4 cup pineapple
1/3 cup baked beans	1/2 cup corn
1/2 cup ice cream	12 skittles
3 Oreos	6 Saltines
42 goldfish crackers	5 Vanilla wafers

Meal planning

- The child can eat any food they want....
 - as long as they know the carbohydrate content of the food serving.
- You can determine the carbohydrate content of food by reading labels.
 - Every food has a label and the label tells you how much carbohydrate is in each serving of the food.
- www.calorieking.com

Reading labels

- Look at the **serving size**
- Calories per serving
- Total Fat
 - Saturated Fat
- **Total Carbohydrates**
 - Fiber
 - Sugar
- Protein

Nutrition Facts	
Serving Size 1 Container (8 oz.)	
Amount Per Serving	Calories from Fat 4
Calories 127	
	% Daily Value*
Total Fat 21g	0%
Saturated Fat 0g	0%
Cholesterol 5mg	2%
Sodium 175mg	8%
Total Carb 17g	6%
Dietary Fiber 0g	0%
Sugars 17g	
Protein 13g	
Vitamin A 0%	Vitamin C 4%
Calcium 45%	Iron 2%

*Percent Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Check out the [KidHealth](#) and [FDA](#) Web sites to read more about food labels.

Generally

- Most kids are allowed 30 to 45 carbs per meal with 15 to 30 grams of carbohydrate per snack.
- As they get older the amount of carbohydrate per meal increases.
- As they grow they need more to eat.
- This is not a restrictive diet (within reason) – it is about healthy eating.

Counting Carbohydrates

- We will give an insulin to carb ratio
 - 1 unit of insulin for every 10 grams of carbohydrate
 - 1 unit for every 15 carbs
 - 1:20
- You determine how much food (or carbohydrates) the child ate or will eat and then determine how much Insulin to give.

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Medications



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Medications

- | | |
|---------|---|
| Insulin | Replaces what the body does not make. |
| Pills | Helps the body make more insulin, and/or
Helps the body use the insulin it does make more efficiently. |

Insulin

- **Most kids need a shot before each meal.**
 - Determine
 1. How many carbs they will eat and
 2. What their blood sugar is
 - This determines how many units of Insulin they need.
 - This is what your pancreas does in response to food
- Some parents choose to give the shot after their child eats.

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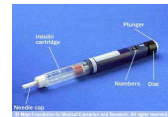
Long Acting Insulin

- This insulin lasts 24 hours
 - Once a day shot
 - Lantus or Levemir
 - Can not be mixed with any other insulin

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Fast Acting Insulin

- Humalog, Novolog or Apidra
 - Goes to work in 5-15 minutes after the shot.
 - Lasts about 3 hours after the shot.
- Can be in a syringe form or a pen form.



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Giving shots

- Sites
 - Arms
 - Thighs
 - Buttocks
 - Abdomen
- Allow the child to pick gives them some control back.
- You can have the shot now or in 5 minutes, but you will get the shot.



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Insulin Pumps

Another way of giving Insulin

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Insulin Pumps

- Small needle is placed into the skin and stays there for 2-3 days.
- Pumps insulin continuously – 24 hours / day
- Gives you a bolus of Insulin before each meal based on what you eat and what your blood sugar is.
- Can be disconnected for short times.

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Low Blood Sugar Hypoglycemia

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Hypoglycemia

- Probably the one problem every person with diabetes will have.
- Be sure to ask the parents “how do you know your child is having a low blood sugar and what do you want me to do about it”.

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Hypoglycemia Symptoms

Mild Symptoms

Shaky	Weak
Sweating	Blurred vision
Fast heart rate	Anxiety
Blurred vision	Tingling in
Dizzy	fingers or lips
Trouble concentrating	
Headache	

Hypoglycemia Symptoms

Moderate to Severe Symptoms

Impaired motor function
Confusion
Inappropriate behavior
Combative
Seizure
Coma

Low Blood Sugar (Hypoglycemia)

- Causes
 - Too much Insulin
 - Not enough food
 - Missing or late with meals / snacks
 - Play, play, play and play some more
 - More activity than usual

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Hypoglycemia Treatment

- Always be prepared.
- Check the blood sugar
- Give 15 grams of carbohydrate
 - 1/2 cup juice 1 cup milk
 - 1/2 cup pop 3 glucose tabs
 - 2-3 pieces hard candy
 - Glucose gel
- Repeat every 15 minutes until feeling better
- Follow with a meal or snack.



You can not mess it up !

- If unsure – give them something to eat.
- If you overfeed, we can bring it down with Insulin.
- If you underfeed, you will be treating a lower, low blood sugar later.
- When in doubt ----- feed them.

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- Always ask the parents what symptoms their child has.
- Always ask the parents how they want the low blood sugar treated.
- Always ask the parents at what number do they want their child treated.

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Low Blood Sugar

- Don't be afraid of a low blood sugar.
- All it means is there is too much insulin in the child's body
 - Get food (sugar) into their body
- If very low, call 911
- If it happens often or on a schedule, the parents need to be involved

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Hyperglycemia

High Blood Sugar

Ketone Testing

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High Blood Sugars

- Symptoms
 - Go to the bathroom a lot
 - Thirsty
 - Tired
 - Headache
 - Blurred vision
 - Trouble concentrating

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High Blood Sugar

o Causes

- Not enough insulin
- Forgetting their insulin
- Extra Food
- Usually active, today not very active
- Stress

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High Blood Sugar

o Treatment

- Check the blood sugar
 - o If > 240 mg, check for ketones
 - o Positive Ketones, danger sign
- Increase fluid – sugar free fluid
- Give extra insulin
- Contact parents
- If they can go back to class, they should check back with you in an hour or so to check the blood sugar.

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High Blood Sugar

- o Ask to see the blood sugar on the meter.
 - The meters all have memories with date and time recall.
- o If they check ketones ask them to put the strip on the paper towel in the bathroom
- o You must document what you saw not what they said.

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High Blood Sugar

- o High blood sugar can turn dangerous fast.
- o Don't let them talk you out of calling their parents
- o Be sure the teachers know this child is having high blood sugars and may need bathroom breaks.

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High Blood Sugar

- o Don't be afraid of a high blood sugar.
- o All it means is there is not enough insulin in the child's body and the parents need to be involved.

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Exercise



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Exercise Let the Children Play

- Works like insulin in the body to help lower the blood sugar.
- They may need an extra snack before hard playing or sporting events.
- Exercise can affect the blood sugar up to 12 – 24 hours later.
- Be sure you always carry some form of sugar with you.
- Always be alert to a low blood sugar.

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Blood Testing



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Blood Glucose Monitoring

- Involves BLOOD!!!!
- Involves POKING THE FINGER!!!!
- Involves PAIN!!!!
- Tells you what the blood sugar is AT THAT MOMENT.
- Tells you the effect of the food, exercise and medication.

Blood Glucose Monitoring

- Normal blood sugar is 65 mg to 110 mg
 - **Target Goal** is 80 mg to 140 mg
- Young children, before puberty,
 - the **target** is 100 mg to 180 mg
- Children, after puberty
 - The **target** is 80mg to 140 mg.

Blood Glucose Monitoring

- Discuss how often to test.
 - Before meals, after meals,
- Discuss **time** of day to test.
 - An hour or two hours after a meal.
- Keep a written record of blood sugar, carbs and how much Insulin was given.
- Discuss what are the blood sugar goals for the child.
- Discuss when the parents want to be called.

What can we do?

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What can we do

- The Goals of Treatment for diabetes in children and adolescents:
 - Physical well-being
 - Long term glycemic control
 - Prevention of microvascular complications
 - Prevention of macrovascular disease
 - Psychological well-being

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General Hints

- Don't blame anyone because the child has high blood sugars – there are too many things that cause blood sugars to go high.
- Help the parent understand that high or low blood sugars happen – get rid of the guilt.
- NEVER, never use the diabetes to blame the child for anything. They will have this disease for a long, long time.
 - And, never use diabetes as an excuse to get out of things.

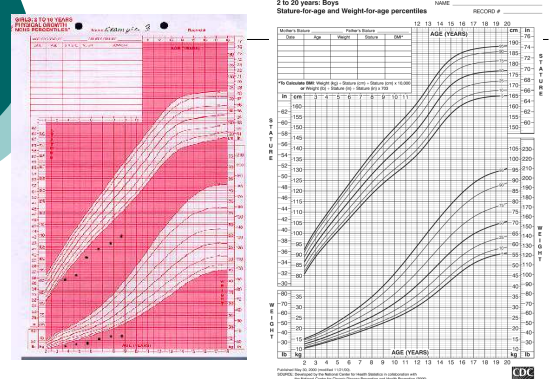
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What can we do

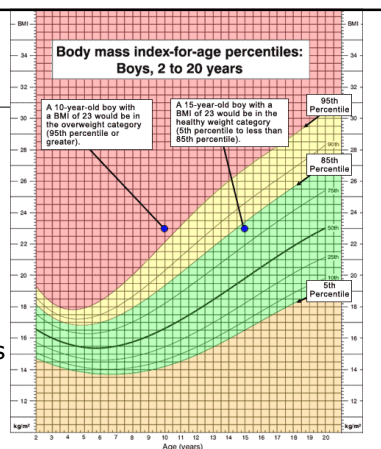
- Physical well-being
 - Normal growth and development
 - Growth charts
 - Achieving and maintaining reasonable body weight
 - Help them grow into their height
 - Give them enough to eat, not for weight loss, but for growth

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The Value of growth charts



Follow Up With Their Doctor Every 3 months



What can we do

- Get rid of the high calorie / high fat foods and drinks
 - Each can of pop (12 oz) is 240 calories and 8 teaspoons of sugar
 - Avoid the power-ade, high energy/sugar drinks
- If they want to lose weight, encourage them to set a goal to lose 7% of their current weight.
 - At this age, we may just ask to not gain any more weight

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What can we do

- Encourage them to eat three meals
 - Maybe they can just drink milk for breakfast – serving size
 - Maybe they can eat a granola bar
 - Remember – fast, easy, quick
- Parents have to help with at home snacks and activity
 - Many kids go home to no parent and just eat and sit in front of the TV
 - Can parents set up a plan for snacks

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What can we do



- The key is reasonable snack servings and variety
 - Can parents package a reasonable snack so the child can choose a good snack
 - 54 gold fish crackers is a snack
 - Ritz bits; wheat thins;
 - Vegetables with dip
 - SF lemonade; bottled water (refill them)



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What can we do



- Maintain a reasonable level of movement
 - Regular activity that is actually activity
 - Walking, biking
 - Goal is start with 5 minutes or 10 minutes
 - Get them to do something every day
 - Jump rope – start with 5 jumps
 - Walk
 - Sit down exercise tapes
 - Get them to increase their time and endurance



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What can we do

- Prevent the complications of diabetes
 - Regular eye exams
 - Regular check ups with MD
 - Blood sugar / Alc
 - Lipids
 - Blood pressure
 - Avoid smoking



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Behavior changes

- **When** do we need to start lifestyle changes?
 - Before puberty fat cells are not permanent ---- after puberty it is very hard to lose weight.
 - The obesity rate started increasing 4-5 years before the diabetes rate started increasing.
 - Obesity develops over time and once it has developed is difficult to treat.
- **Seems like we need to start very early**


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Where to start


1. Build the child's self esteem
2. Encourage small changes
3. In school get the administration, nurses, teachers, etc involved
4. Have to have the parents involvement
5. Have to model good food choices and /or servings sizes at school

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Enjoy drinking water



1. Stop high calorie beverages – this includes powerade, fruit juice etc.
2. People who drink sugar free drinks do not lose as much weight as people who drink water
3. The goal is 6-8 8 ounce glasses each day.



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What do school nurses or non-nursing school staff need to know?

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What do school nurses or non-nursing school staff need to know

- Recognize there is a difference between type 1 and type 2 diabetes
- The pathophysiology of type 2 diabetes in children is very similar to that of adults
- A chronic condition in a child will be a chronic condition in an adult

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What do school nurses or non-nursing school staff need to know

- Don't be afraid of the child.
- It is only diabetes – you can't catch it.
- Some kids are very private about testing or taking shots.
- Allow them a safe, quiet place to test.
 - They may already be getting enough "teasing" from other kids.

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What do school nurses or non-nursing school staff need to know

- Often the kids will see the school nurse or office as a safe place.
- A place to go when they need medical help
- Or they did not study and need some nice people to get them out of class
 - This is hard to determine
 - Look for patterns

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What do school nurses or non-nursing school staff need to know

- This depends on the age of the child.
- Some kids need a place to test their blood sugar and/or take their insulin.
 - Parents want them to be "checked" by someone.
 - Some are embarrassed and do not want to test in front of others
 - Respect their privacy
- Some kids will seldom be there. They take care of themselves.
 - You still need to know who they are in case of a problem.

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What do school nurses or non-nursing school staff need to know

- Talk with parents about
 - How does your child look when they have a low or a high blood sugar
 - How do you treat a low blood sugar
 - What blood sugars do you want to be called about
 - < ____ or > ____
 - Where do I reach you at when I have questions

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What do school nurses or non-nursing school staff need to know

- Teachers need to know about low blood sugars
 - Tired, falling asleep
 - Sweating
 - Blank stare
 - Not acting normal ????
- Teachers need to know how to treat the low
- Kids are terrified of this happening in school and they will be embarrassed.

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What do school nurses or non-nursing school staff need to know

- Parents may need to bring in an extra blood glucose meter
 - Test strips, lancets, alcohol
- Parents may need to bring in an insulin supply
 - Extra vial or pen for emergencies or noon shot
- Parents may need to bring in Ketone strips

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What do school nurses or non-nursing school staff need to know

- Parents are responsible for bringing in snacks and low blood sugar treatment foods/drinks
 - 4 ounce juice boxes
 - Crackers
 - 100 calorie snacks

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What do school nurses or non-nursing school staff need to know


- If a child in your school usually comes into the office to test and they don't show up
 - Go find them
 - Low blood sugars make them wander
- Teachers need to know if the child has a low blood sugar, do not send them to the office alone.
 - Low blood sugars make them wander

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Summary

- We are all working in the best interest of the child.
- Communicate with the parents.
- Listen to the parents – they deal with this 24 hours a day.
- Parents want to be listened to and they want to know their child is SAFE while they are with you.

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What do school nurses or non-nursing school staff need to know

- Here is a great web site
- www.barbaradaviscenter.org
- There is a book called Understanding Diabetes
 - Chapter 23 is diabetes in the school

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Thank You

Comments

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